

## **ABSTRACT**

The present invention provides a system of self-assembling peptide amphiphiles with an absolute net charge of 3 or greater whose design and function may be patterned after proteins involved in vertebrate mineralization or other tissue forming processes. This molecular system preferably consists of a hydrophobic hydrocarbon tail attached to a relatively hydrophilic peptide sequence. Self-assembly of this peptide amphiphile may be induced through pH variation, divalent ion addition, or dehydration. Variations of structural peptide sequences in the peptide amphiphile may enable the assembled nanofibers to be reversibly cross-linked for more or less structural stability, or may allow for control of the rate of self-assembly.